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09/866,773	05/30/2001	Takeshi Takatsuka	32405W080	5025

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EXAMINER	
LAROSE, COLIN M	
ART UNIT	PAPER NUMBER
2627	

DATE MAILED: 10/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/866,773	TAKATSUKA ET AL.	
	Examiner	Art Unit	
	Colin M. LaRose	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 July 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5-7 and 9* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5-7 and 9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Arguments and Amendments

1. Applicant's amendments and arguments filed 18 July 2005, have been entered and made of record.

Response to Amendments and Arguments

2. Applicant's amendments and corresponding arguments for independent claims 1 and 7 are sufficient to overcome the previous rejections thereof. Therefore, the previous rejections of claims 1 and 7 have been withdrawn. However, new grounds of rejection are presented below in view of newly discovered prior art.

Also, with regards to claim 6, Applicant asserts that the rejection is based on hindsight and involves merely picking and choosing come features while ignoring others. However, as explained below, the prior art does provide the teachings and motivation for one skilled in the art to essentially pick and choose which sensors to use on the basis of environmental conditions, and the utilization of certain sensors then becomes a design issue in the framework of a specific application.

Claim Objections

3. The following sections of 37 CFR §1.75(a) and (d)(1) are the basis of the following objection:

> (a) The specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention or discovery.

> (d)(1) The claim or claims must conform to the invention as set forth in the remainder of the specification and the terms and phrases used in the claims must find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description.

4. Claims 1-3, 5, and 6 are objected to under 37 CFR §1.75(a) and (d)(1) as failing to particularly point out and distinctly claim the subject matter that the applicant regards as the invention.

Regarding claim 1, it appears that "three-dimensional vision data" in the last "wherein"clause should be changed to "three-dimensional view data" in order to be consistent with the corresponding feature in the "integrated view data generator" clause. Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claim 9 is rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 6,061,068 by Hoffman, II et al. ("Hoffman").

Regarding claim 9, Hoffman discloses an integrated view system (figure 2) comprising:

at least one stereo-camera (12) installed in a vehicle for taking images of predetermined outside area (column 13, lines 1-6: the sensor comprises a stereo pair of different sensors whose image data is fused together in a common coordinate system);

a stereo-image recognizer (17) for processing a pair of images taken by the stereo-camera to recognize objects that are obstacle to the front, thus generating obstacle data (the processor 17 utilizes the images taken by the sensor system 12 to recognize "virtual" objects that correspond to e.g. stored terrain data 34 in a virtual world database 23; obstacle data corresponding to such virtual (i.e. "symbolized" – not real images) objects is generated at block 37 – see column 3, lines 53-60 and column 4, lines 18-24);

a geographical image generator (36) for generating a geographical image viewed from viewing points of a pilot crew (i.e. the sensor imagery is utilized to generate a common-coordinate transformed measured image set that represents actual geographical terrain imagery);

an integrated view data generator (24) for generating integrated view data including 3-D view data based on the pair of images taken by the stereo-camera, the obstacle data including at least one symbolized (i.e. virtual) obstacle from the stereo-image recognizer, and the geographical image from the geographical image generator (the combining block 24 combines, or integrates, the real imagery from the sensor 12 with the generated virtual object imagery from the virtual database 23 and the transformed measured image ("geographical image") to generate integrated data that includes data pertaining to e.g. the fused real-imagery 3-D terrain features); and

an integrated image display for displaying the integrated view data as visible images overlapping with an actual view from a cockpit (i.e. the output images are sent to a display, as shown in figure 2, wherein the integrated data includes the actual view).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 1-3 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,061,068 by Hoffman, II et al. ("Hoffman").

Regarding claims 1 and 7, Hoffman discloses an integrated view system (figure 2) comprising:

at least one stereo-camera (12) installed in a vehicle for taking images of predetermined outside area (column 13, lines 1-6: the sensor comprises a stereo pair of different sensors whose image data is fused together in a common coordinate system);

a stereo-image recognizer (17) for processing a pair of images taken by the stereo-camera to recognize objects that are obstacle to the front, thus generating obstacle data (the processor 17 utilizes the images taken by the sensor system 12 to recognize "virtual" objects that correspond

to e.g. stored terrain data 34 in a virtual world database 23; obstacle data corresponding to such virtual (i.e. "symbolized" – not real images) objects is generated at block 37 – see column 3, lines 53-60 and column 4, lines 18-24);

an integrated view data generator (24) for generating integrated view data including 3-D view data based on the pair of images taken by the stereo-camera and the obstacle data from the stereo-image recognizer (the combining block 24 combines, or integrates, the real imagery from the sensor 12 with the generated virtual object imagery from the virtual database 23 to generate integrated data that includes data pertaining to e.g. the fused real-imagery 3-D terrain features); and

an integrated image display for displaying the integrated view data as visible images to crew in the vehicle (i.e. the output images are sent to a display, as shown in figure 2),

wherein the integrated view data generator is capable of removing the 3-D vision data from the integrated view data by turning off the stereo-camera while retaining the obstacle data (column 12, lines 50-65: when the image data from the sensor system is "unreliable," the virtual object data is utilized in lieu of the sensor data or a combination of the sensor and virtual data, thereby removing the fused real-image data and retaining only virtual objects; although Hoffman does not expressly state that the sensors are turned off, Hoffman teaches essentially the equivalent thereof in that that sensors are disabled for a period of time since they are not providing reliable image data).

Regarding claim 2, Hoffman discloses adding peripheral wide-area view data to the 3-D view data (i.e. the sensors capture images of a wide view of terrain taken from an airplane, which view-view imagery is integrated as explained above for claim 1).

Regarding claim 3, Hoffman discloses including a head mount display for overlapping the visible images of the integrated view data and the actual view (column 12, lines 9-30: the integrated data is displayed on a head-mounted display, and the integrated data includes the actual view as explained above for claim 1).

10. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,061,068 by Hoffman, II et al. ("Hoffman") in view of [Copeland89] (J.W. Copeland, *U.S. Patent 4,805,015*).

Regarding claim 5, Hoffman discloses utilizing two different sensors in a stereo fashion (see e.g. column 13, lines 1-6), but does not expressly disclose two IR cameras, as claimed.

[Copeland89] discloses an airborne imaging system similar to that of Hoffman, whereby stereo images from an airplane are captured in order to aid in navigation of the airplane. In particular, [Copeland89]suggests that the sensor pairs **(13,14)**, **(A,A′)**, **(B,B′)**, and **(C,C′)** may be infrared (IR) cameras ([Copeland89] column 5, lines 49-51) – that is,

> (5.) The stereo-camera includes two infrared cameras. As with all stereo vision systems, the stereo sensors are separated from each other by a distance corresponding to a specific baseline.

Given this, it would have been obvious to one of ordinary skill in the art, at the time of the Applicant's claimed invention to use IR cameras for obtaining stereo pairs consisting of IR

spectrum images. IR cameras are capable of detecting objects at night or when obscured by shadows. Therefore, the proposed modification of [Copeland89] would result in a vision system capable of viewing objects in the dark.

11. Claims 6 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Hoffman in view of [Copeland89], as applied above with respect to Claim 5, and further view of [Sarangapani00] (J. Sarangapani, *U.S. Patent 6,055,042*) and [Owens00] (K. Owens and L. Matthies, *Passive Night Vision Sensor Comparison for Unmanned Ground Vehicle Stereo Vision Navigation*, IEEE International Conference on Robotics and Automation, April 2000).

The following is in regard to Claim 6. [Copeland89] suggests the use of several different types of stereo sensors (cameras). These include, for example, digital video cameras, infrared cameras, radar receivers, and sonar ([Copeland89] column 5, lines 49-52). However, [Copeland89] does not show or suggest using these sensors together, in an alternating fashion, which is contingent upon the "actual views".

[Sarangapani00] discloses a method for detecting obstacles using multiple sensors, comprising:

($6.a_{Sarangapani.}$) Using multiple sensors ([Sarangapani00] column 2, lines 5-11 and Fig. 8, step **802**). As disclosed in [Sarangapani00], these sensors can include, but are not limited to, radar scanners, sonar scanners, laser scanners, optical cameras, and infrared (IR) cameras ([Sarangapani00] column 3, lines 28-30).

($6.b_{Sarangapani.}$) Selectively using the sensors in accordance with the actual views (cf.

> [Sarangapani00] Fig. 8). [Sarangapani00] assigns a weight to each sensor based on observed environmental *parameters* ([Sarangapani00] column 3, line 61 through column 4, lines 32 and column 5, line 66 through column 6, line 17). For example, one parameter could be the amount of ambient light observed. In conditions of low ambient light (e.g. night, fog dust, etc.), for instance, low weighting factors are assigned to sensors which are sensitive to the amount of ambient light. On the other hand, a larger weight is assigned to sensors which are not affected by the amount of ambient light. The weights could, for example, take on values between 0 and 1. In this case, under low light conditions, the weight of an optical sensor would approach 0, whereas less sensitive sensors, like IR or radar, would receive a weight closer to 1. Effectively, a sensor is selected in accordance with the observed environmental conditions, and its known amenability to such conditions (as reflected by its assigned weight). Conditions, such as ambient light, relate to the "actual view".

It would have been obvious to one of ordinary skill in the art, at the time of the Applicant's claimed invention, modify the aforementioned combination of Hoffman and [Copeland89] to use several types of sensor technologies. Clearly, the benefit of using several different sensor technologies is that it would permit the observation of the environment in varying environmental conditions. With respect to the systems of Hoffman and [Copeland89], the usage of multiple sensors would allow obstacles to be observed in stereo, modeled, and displayed to the user, even in unfavorable viewing conditions. Also, provided the teachings of [Sarangapani00], it would

have been obvious to one of ordinary skill in the art, at the time of the Applicant's claimed invention, to utilize these sensors selectively in accordance with the observed environmental conditions (actual view). Using the different sensor technologies in this manner ensures that the most suitable type of sensor is chosen (or, at least, that ineffectual sensors are not used), given the observed environmental conditions.

As stated above, the teachings of [Sarangapani00] are not limited to any particular type of sensor technology. Hoffman and [Copeland89] both suggest the usage of IR sensors, particularly in conditions of low ambient light. In particular, [Copeland89] suggests applying IR sensors to stereo vision. However, neither Hoffman, [Copeland89], nor [Sarangapani00] suggest the usage of "intensifiers".

[Owens00] provides a comparative study of various night vision technologies employed in the authors' stereo-vision navigation system. [Owens00] contemplates using several different types of night vision technologies. These include the four major groups of commercial-off-the-shelf (COTS) night vision technologies: 3-5 micron cooled Indium Antimonide (InSb), (2) 8-12 micron cooled Mercury Cadmium Telluride (MCT) and 8-12 micron cooled GaAs Quantum Well Infrared Photodetectors (QWIP), (3) 8- 12 micron uncooled microbolometers and pyroelectric detectors and (4) *third generation image intensifiers* ([Owens00] page 123, Section 2.0: *Stereo Disparity Error Analysis*, paragraph 1).

Since image intensifiers are a well-known night vision technology, and given their demonstrated usage in stereo-vision systems such as that of [Owens00], it would have been obvious to one of ordinary skill in the art, at the time of the Applicant's claimed invention to use image intensifiers as one of the multiple sensor technologies in the aforesaid combination of Hoffman,

[Copeland89], and [Sarangapani00]. As just stated, image intensifiers are useful in night vision. Image intensifiers and IR sensors detect light from different portions of the electromagnetic spectrum. Image intensifiers are attuned to the visible and near-infrared regions of the electromagnetic spectrum, whereas the cooled and uncooled FLIR sensors in [Owens00] operate in the thermal range of the IR spectrum. Because thermal IR sensors detect emitted thermal radiation, they are less susceptible than image intensifiers (which detect the visible and near-IR radiation reflected from an object) to obscuration due to fog, smoke, dust, etc. Thermal imagers can also detect objects at further distances than image intensifiers. However, thermal imagers generally lack the resolution of image intensifiers. Therefore, image intensifiers and IR sensors can be used in a complementary fashion. Image intensifiers would be preferable in clear, low-light situations. Thermal IR sensors, on the other hand, could be used in instances when image intensifiers may fail, such as in conditions of fog, smoke, dust, or when objects are located at distances outside the range of an image intensifier. The presence of fog, smoke, dust, etc. and the distance of an object could all be treated as environmental parameters in accordance with [Sarangapani00]. Selection between the sensors could be effected according to the methodology prescribed in [Sarangapani00].

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Colin M. LaRose whose telephone number is (571) 272-7423. **Please note that this application has been reassigned to Colin LaRose.** If attempts to reach the examiner by telephone are unsuccessful, the examiner's acting supervisor, Bhavesh Mehta, can be reached on (571) 272-7453. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the TC 2600 Customer Service Office whose telephone number is (571) 272-2600.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CML
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VIKKRAM BALI
PRIMARY EXAMINER